

Chapter 2

Consumer Behavior

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Consumer Behavior

- There are three steps involved in the study of consumer behavior
 1. *Consumer Preferences*
 - To describe how and why people prefer one good to another
 2. *Budget Constraints*
 - People have limited incomes

Consumer Behavior

3. Given preferences and limited incomes, what amount and type of goods will be purchased?
 - What combination of goods will consumers buy to maximize their satisfaction?

Budget Constraint

- Describe budget constraint
 - Algebra
 - Graph
- Describe changes in budget constraint
- Government programs and budget constraints
- Non-linear budget lines

Consumption Bundle

- A consumption bundle containing x_1 units of commodity 1, x_2 units of commodity 2 and so on up to x_n units of commodity n is denoted by the vector (x_1, x_2, \dots, x_n) .

Physical Constraints

- Non-negative:

Consumption set:

$$X = \{ (x_1, \dots, x_n) \mid x_1 \geq 0, \dots, x_n \geq 0 \}$$

- A **consumption set** is the collection of all physically possible **consumption bundles** to the consumer
- You only have 24 hours a day

Budget Constraints

- Commodity prices are p_1, p_2, \dots, p_n .
- Q: When is a bundle (x_1, \dots, x_n) affordable at prices p_1, \dots, p_n ?

- A: When

$$p_1 x_1 + \dots + p_n x_n \leq m$$

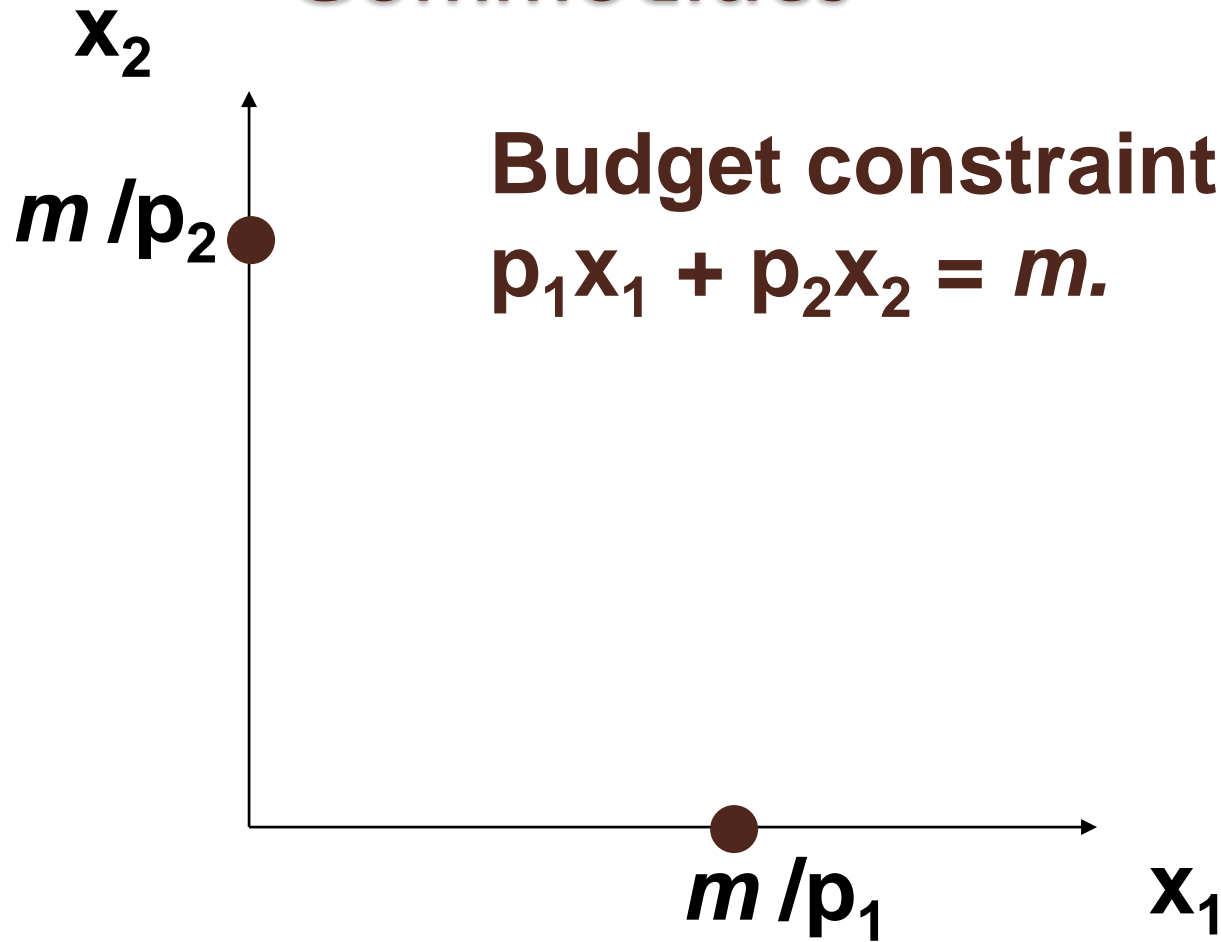
where m is the consumer's (disposable) income.

Budget Constraints

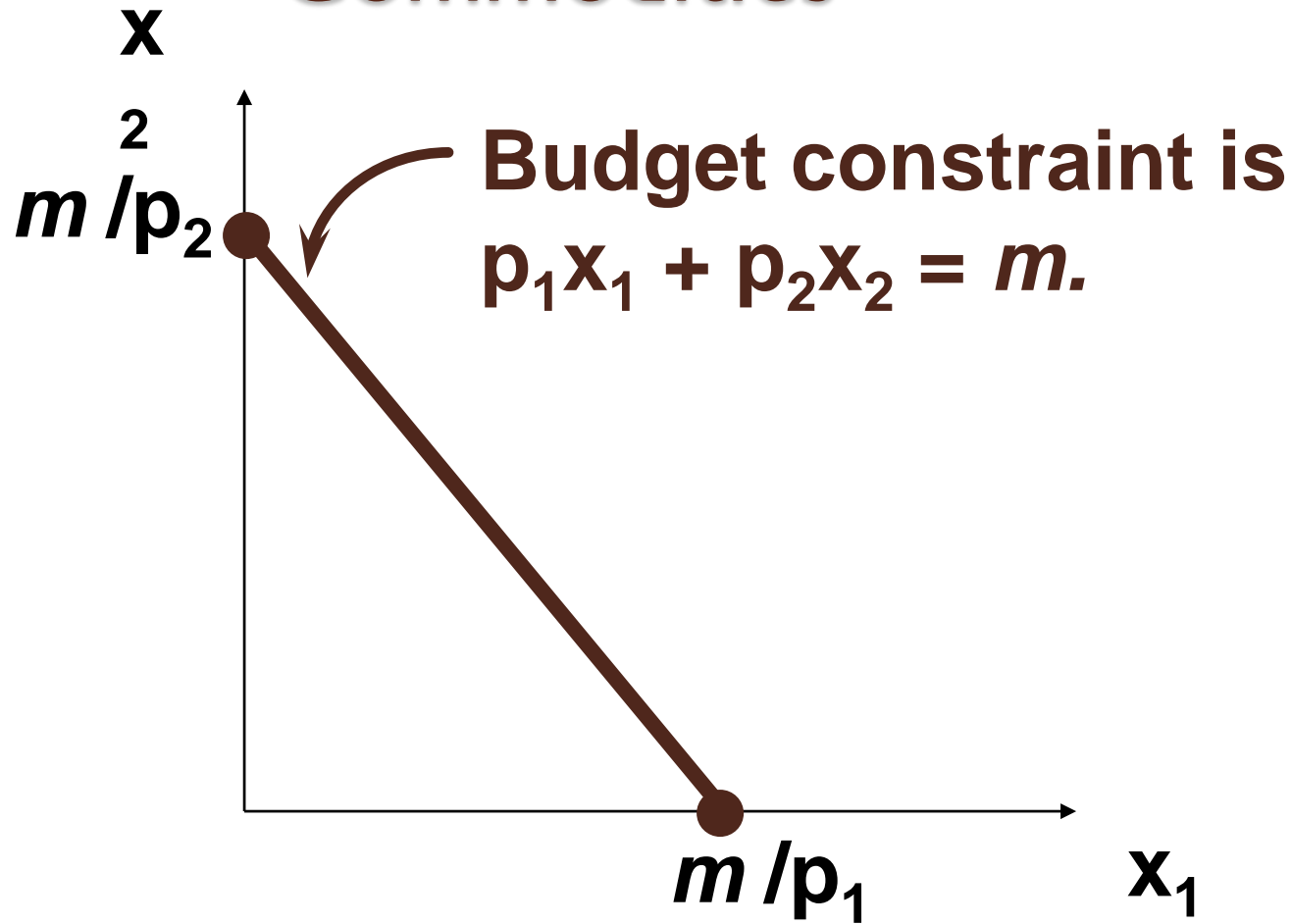
- The bundles that are only just affordable form the consumer's **budget constraint**. This is the set

$$\{ (x_1, \dots, x_n) \mid x_1 \geq 0, \dots, x_n \geq 0 \text{ and } p_1 x_1 + \dots + p_n x_n = m \}.$$

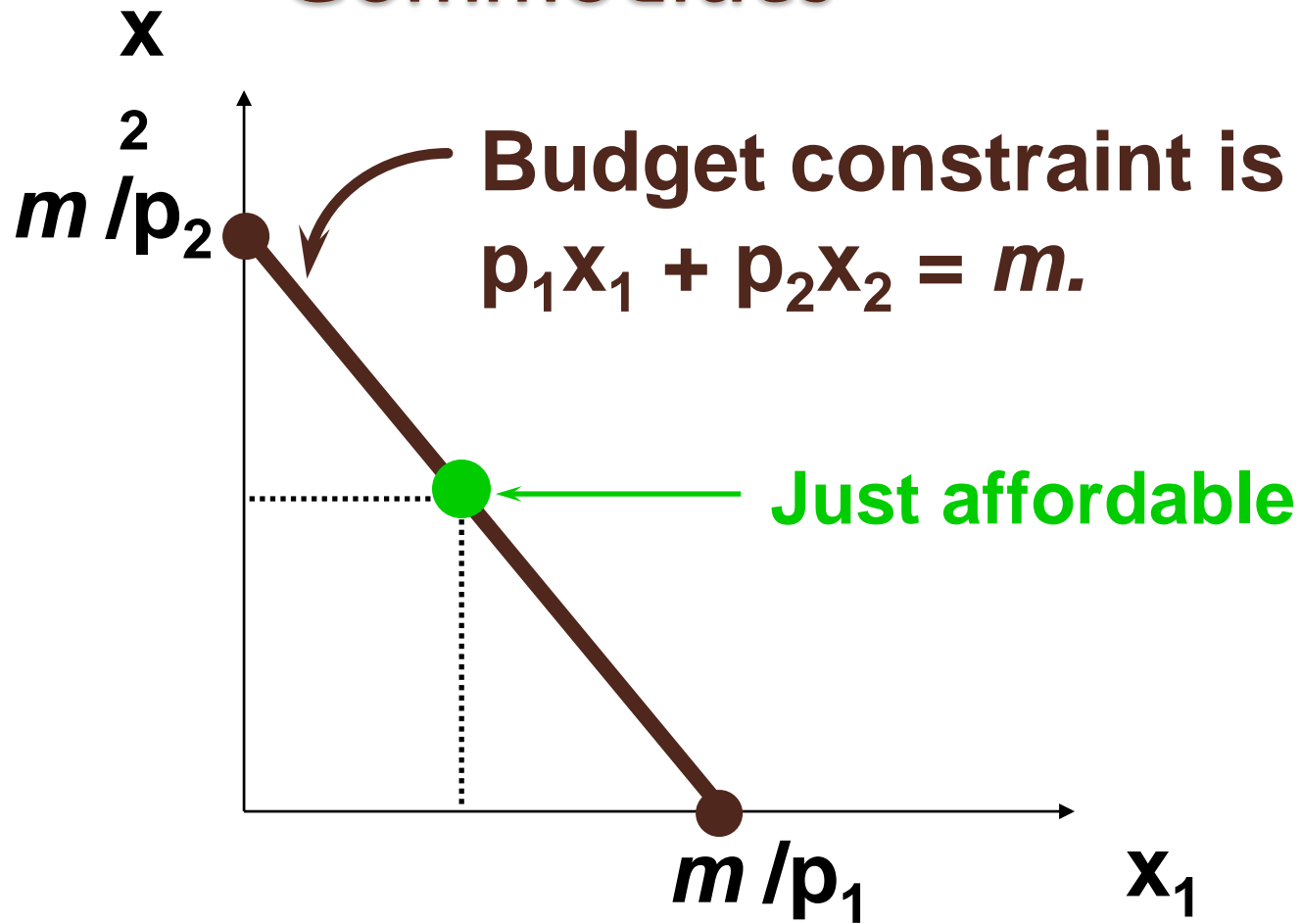
Budget Set and Constraint for Two Commodities



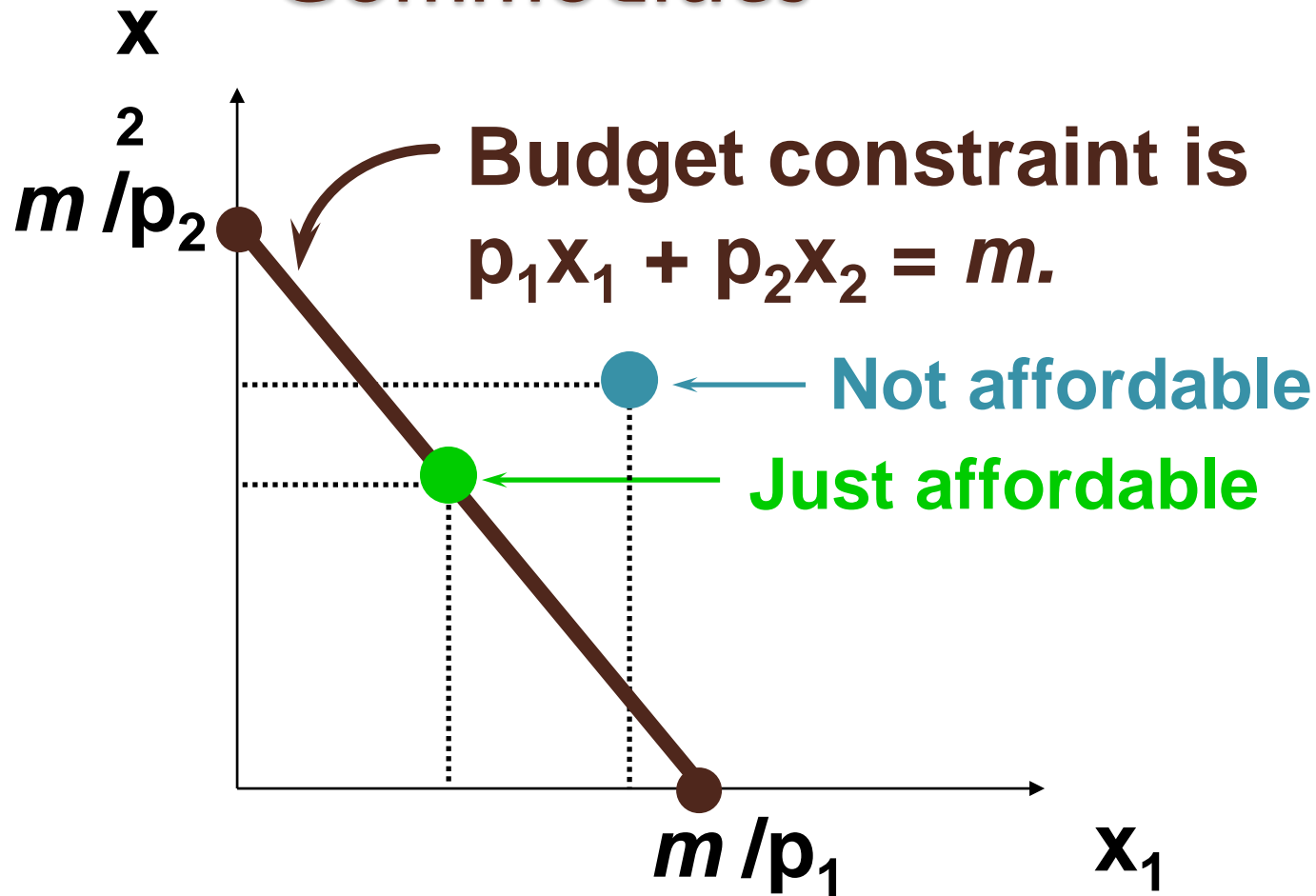
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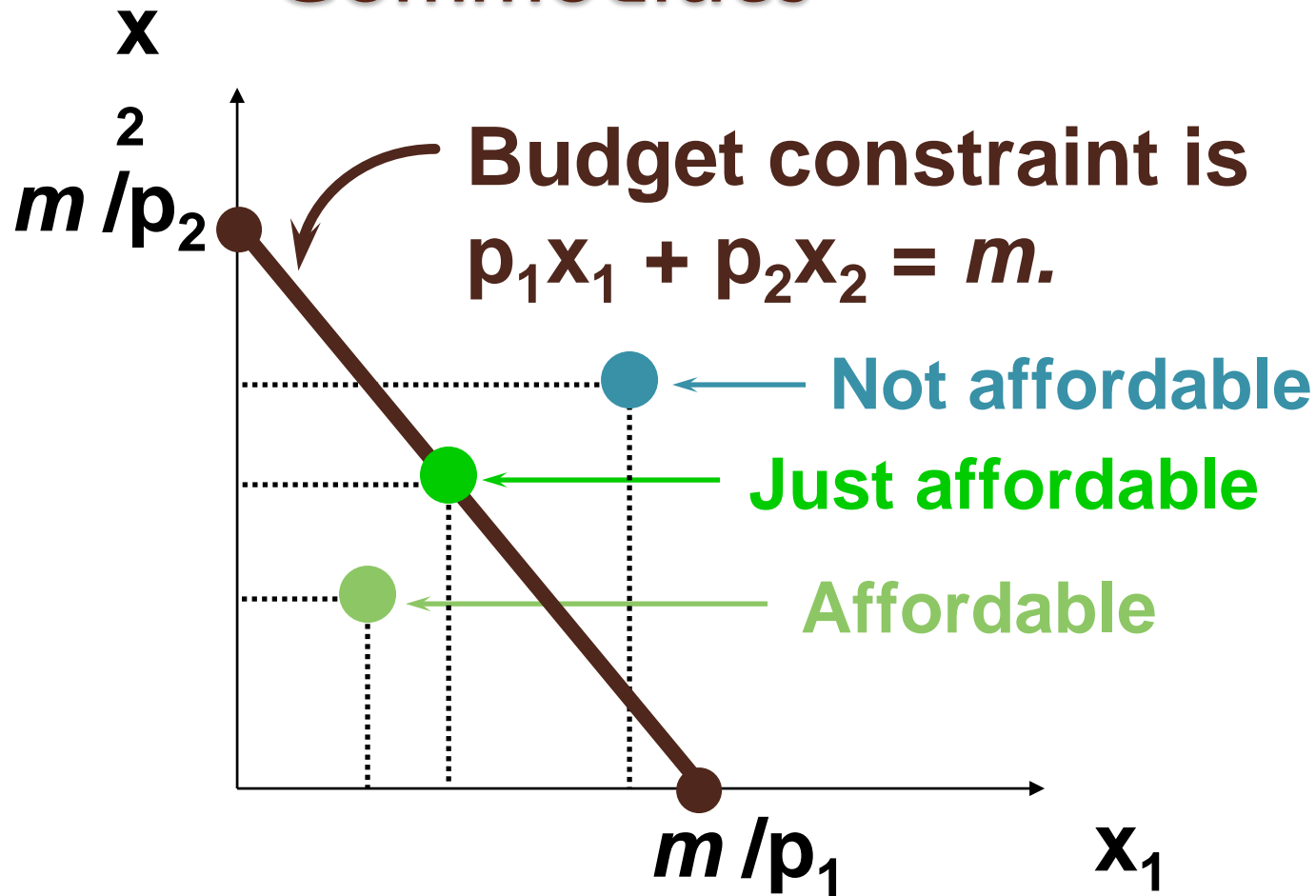
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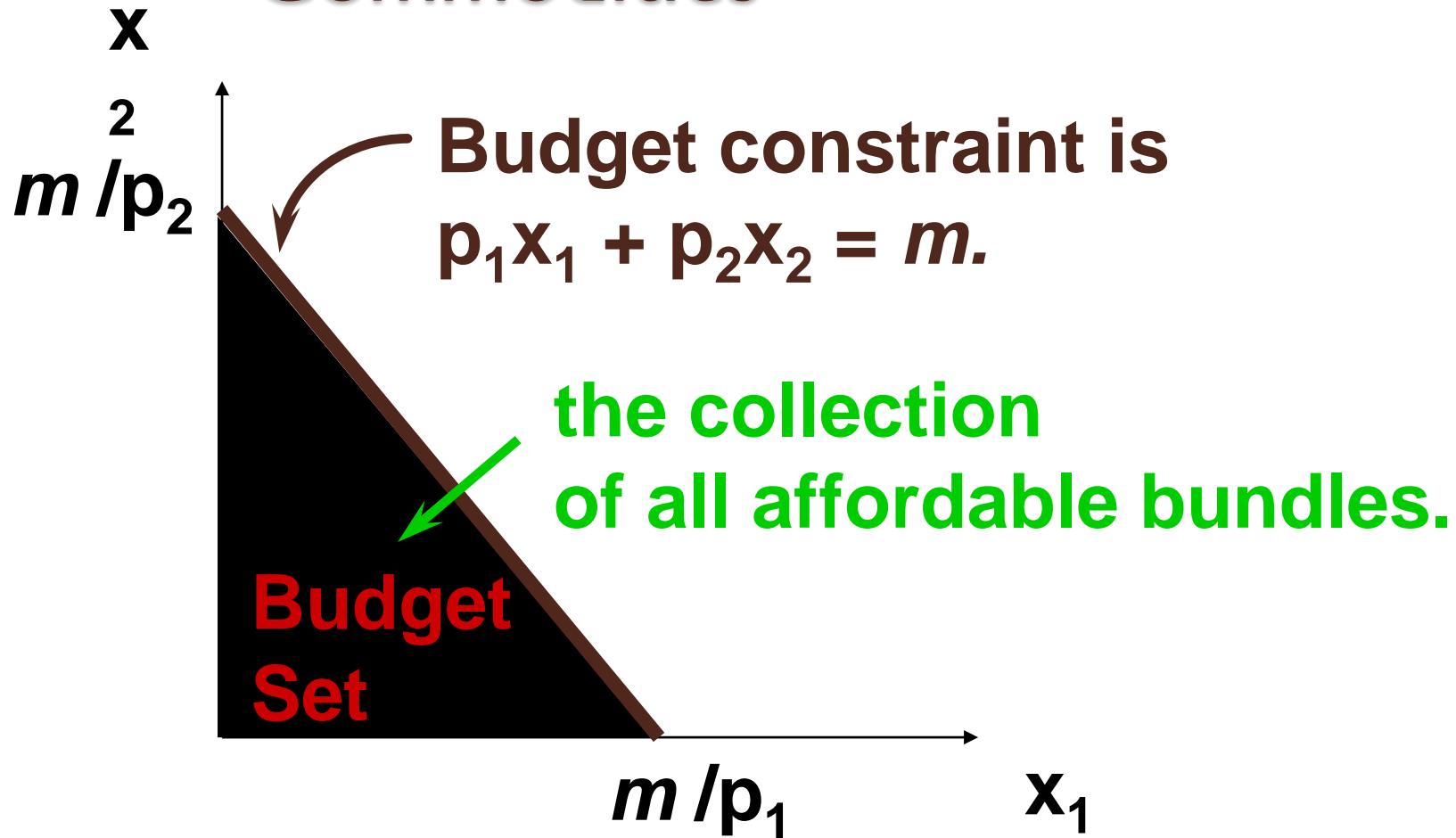
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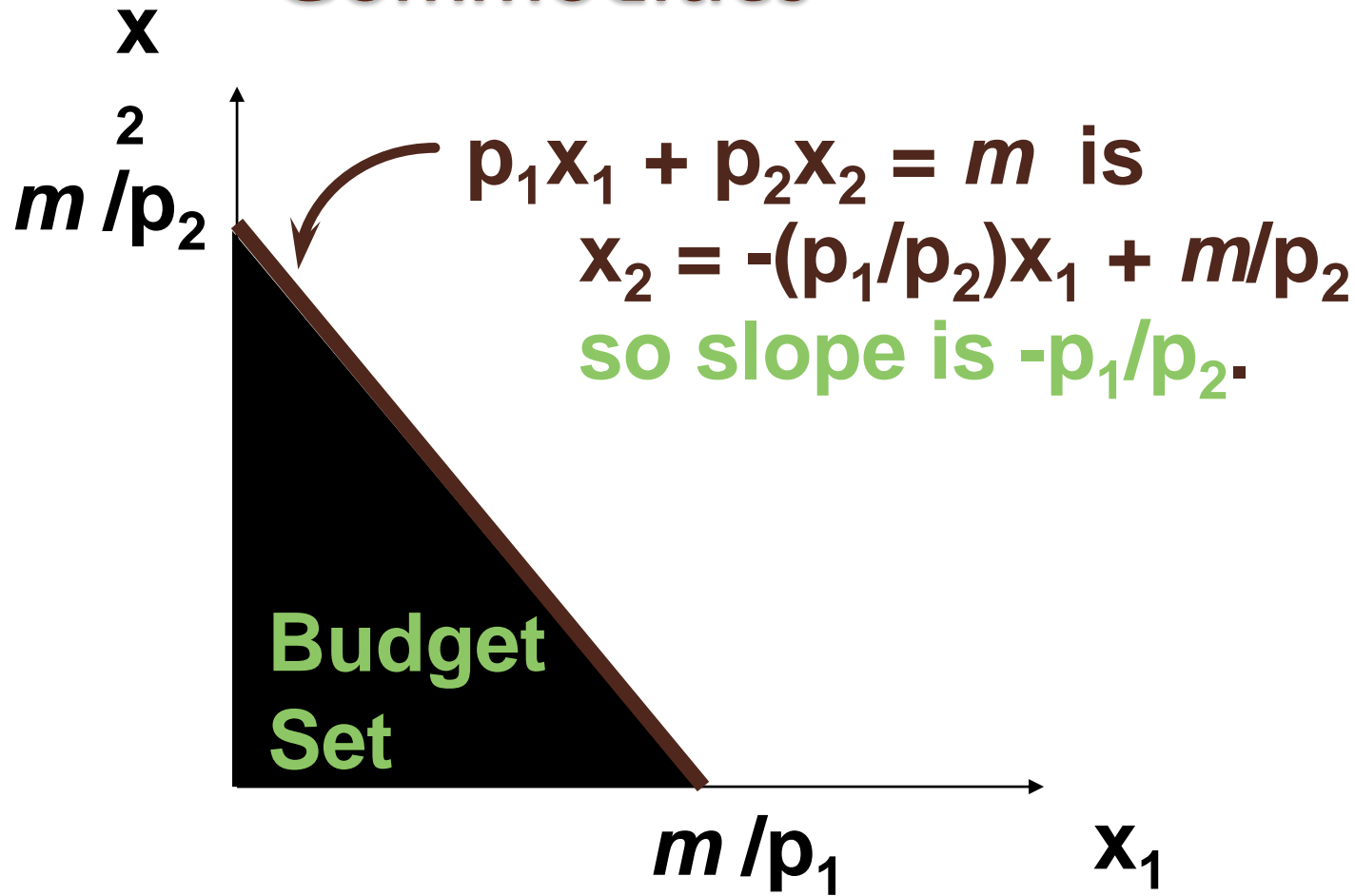
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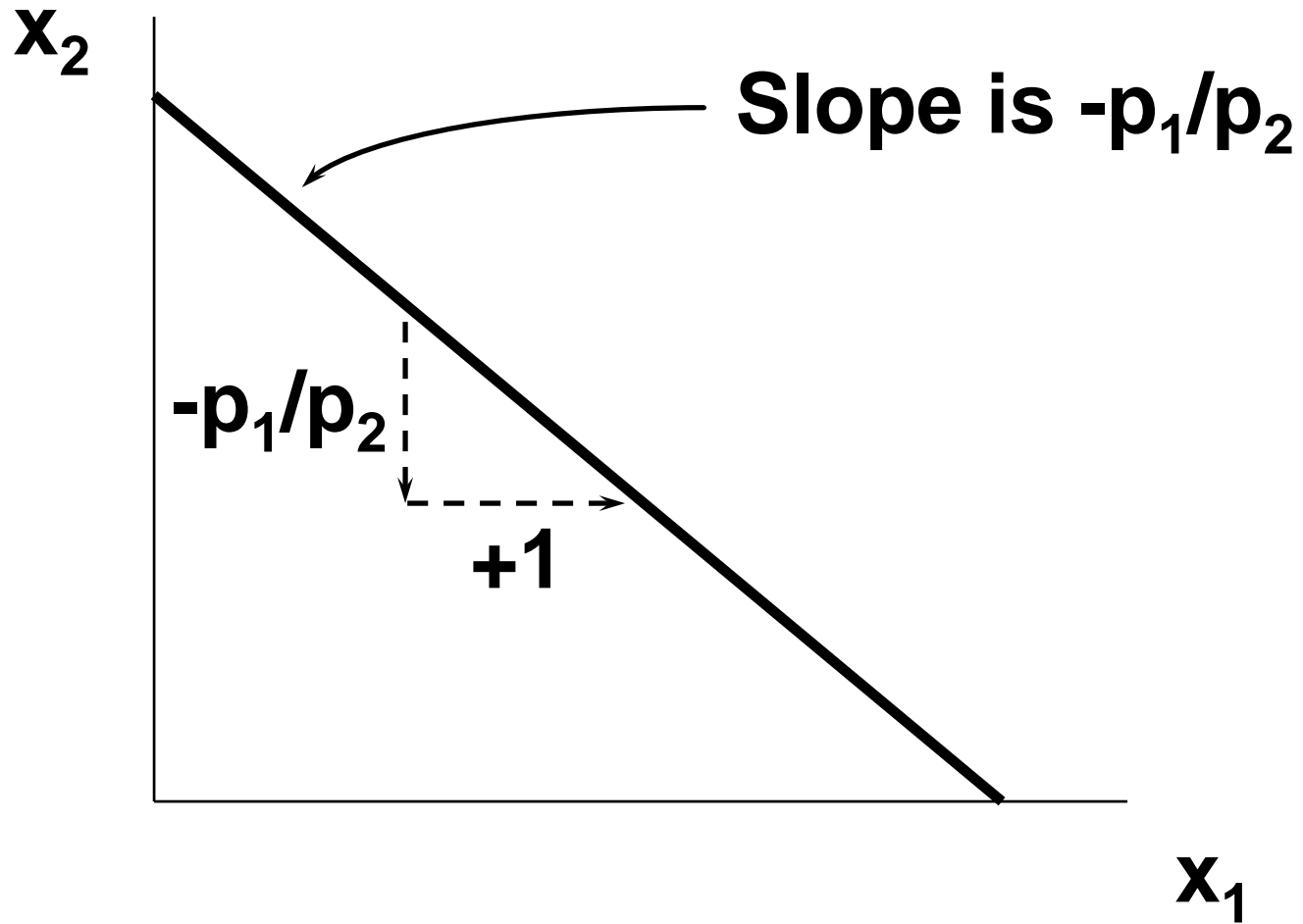
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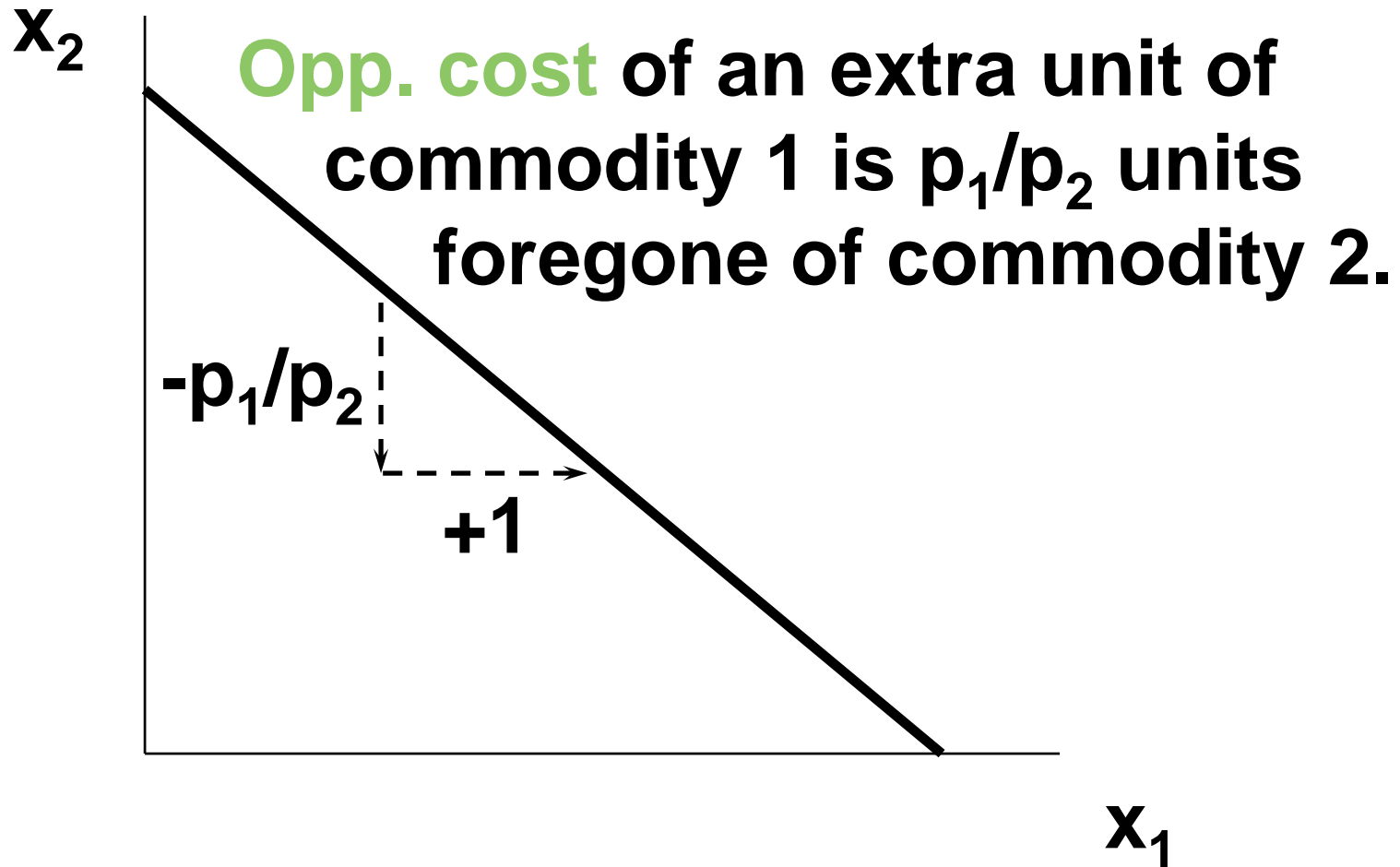
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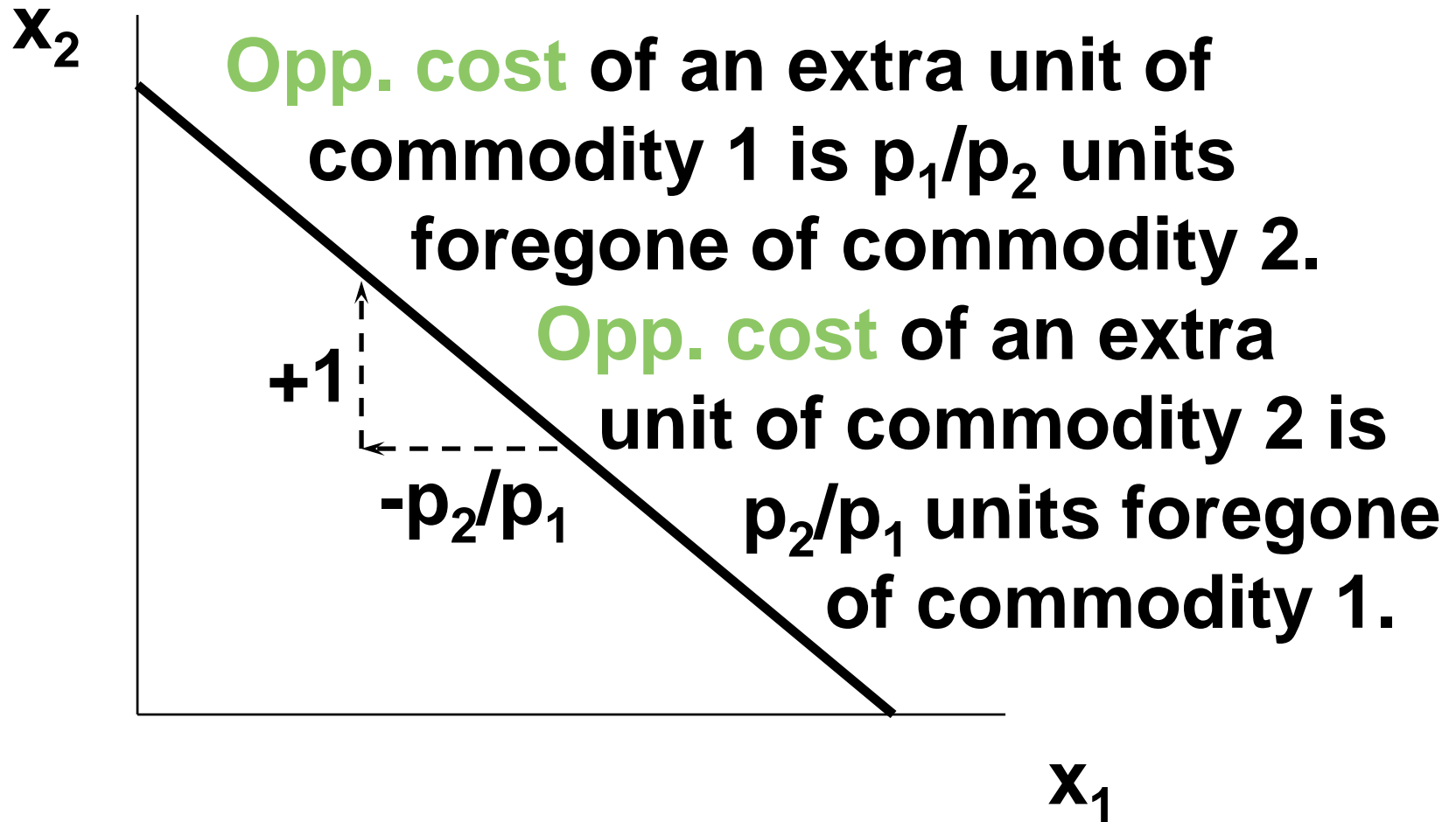
Budget Constraints



Budget Constraints



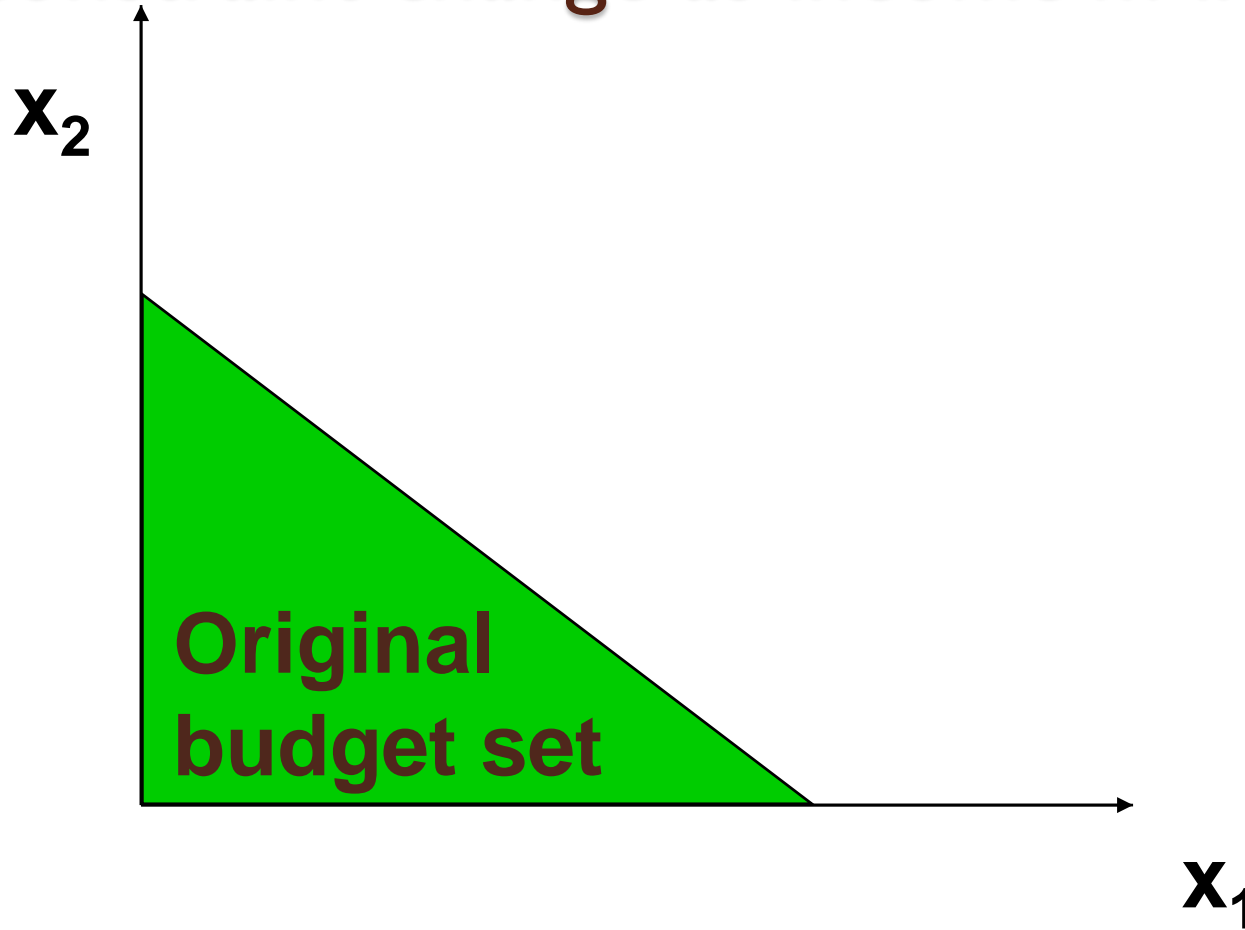
Budget Constraints



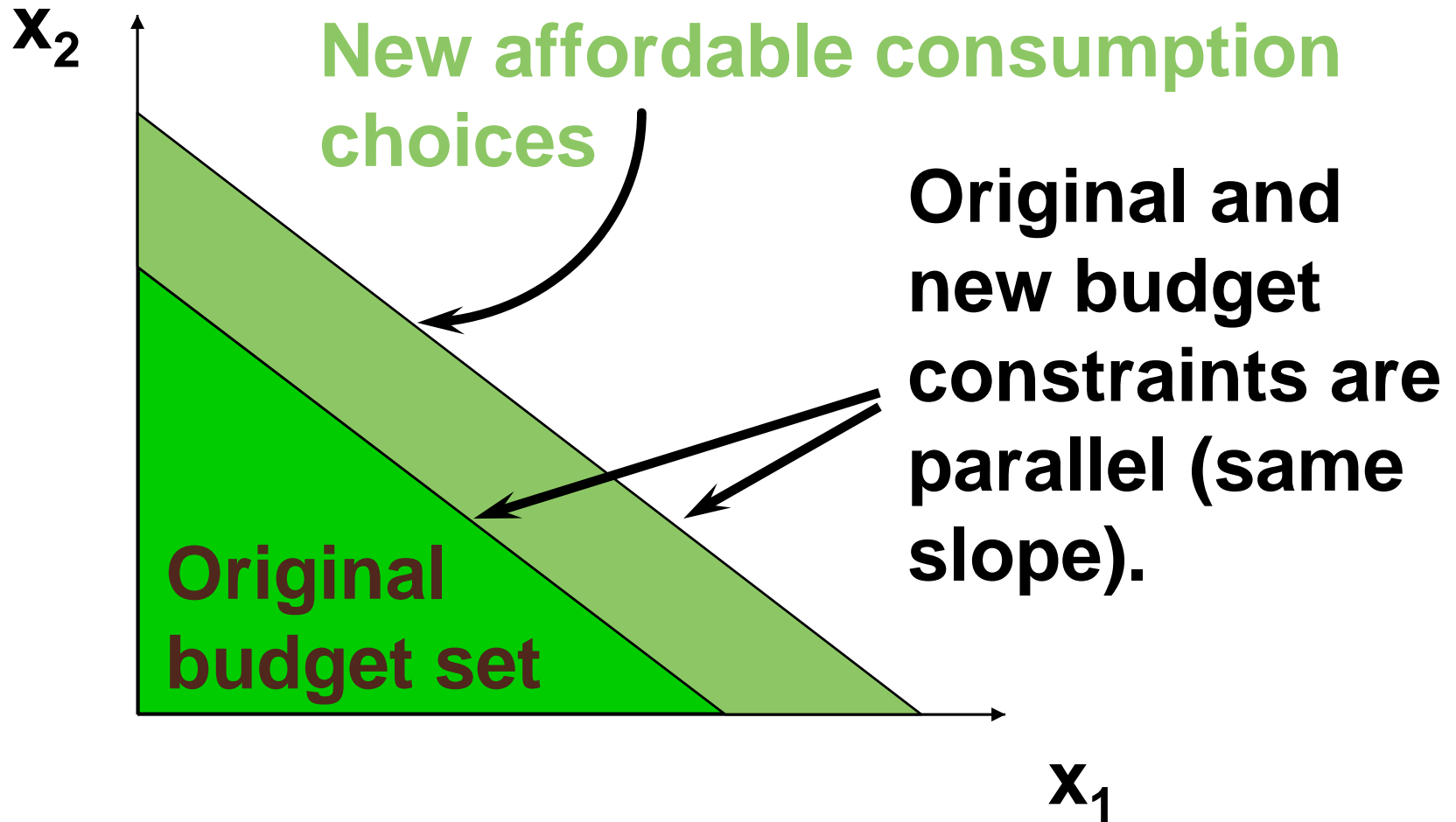
Budget Sets & Constraints; Income and Price Changes

- The budget constraint and budget set depend upon prices and income. What happens as prices or income change?

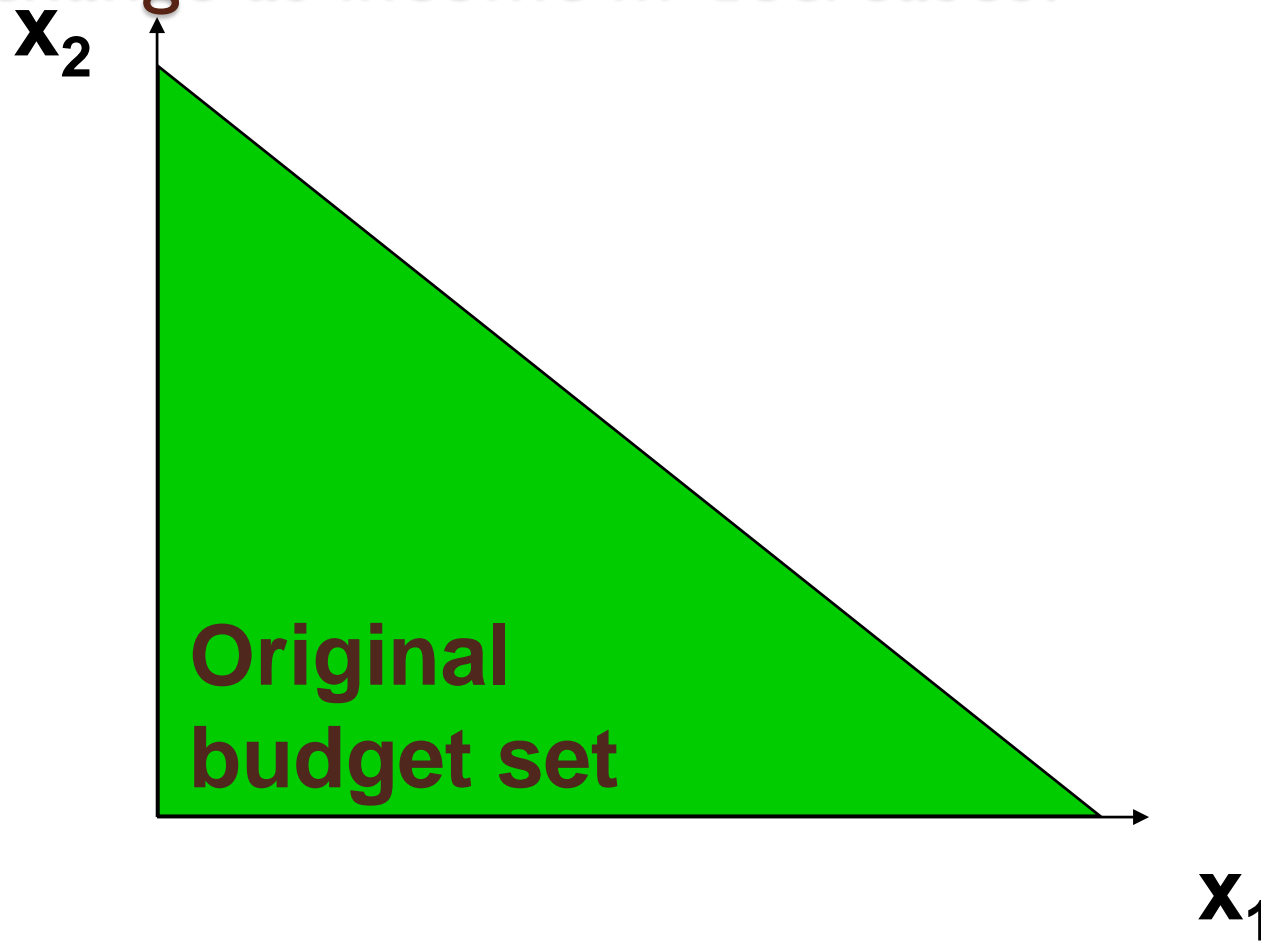
How do the budget set and budget constraint change as income m increases?



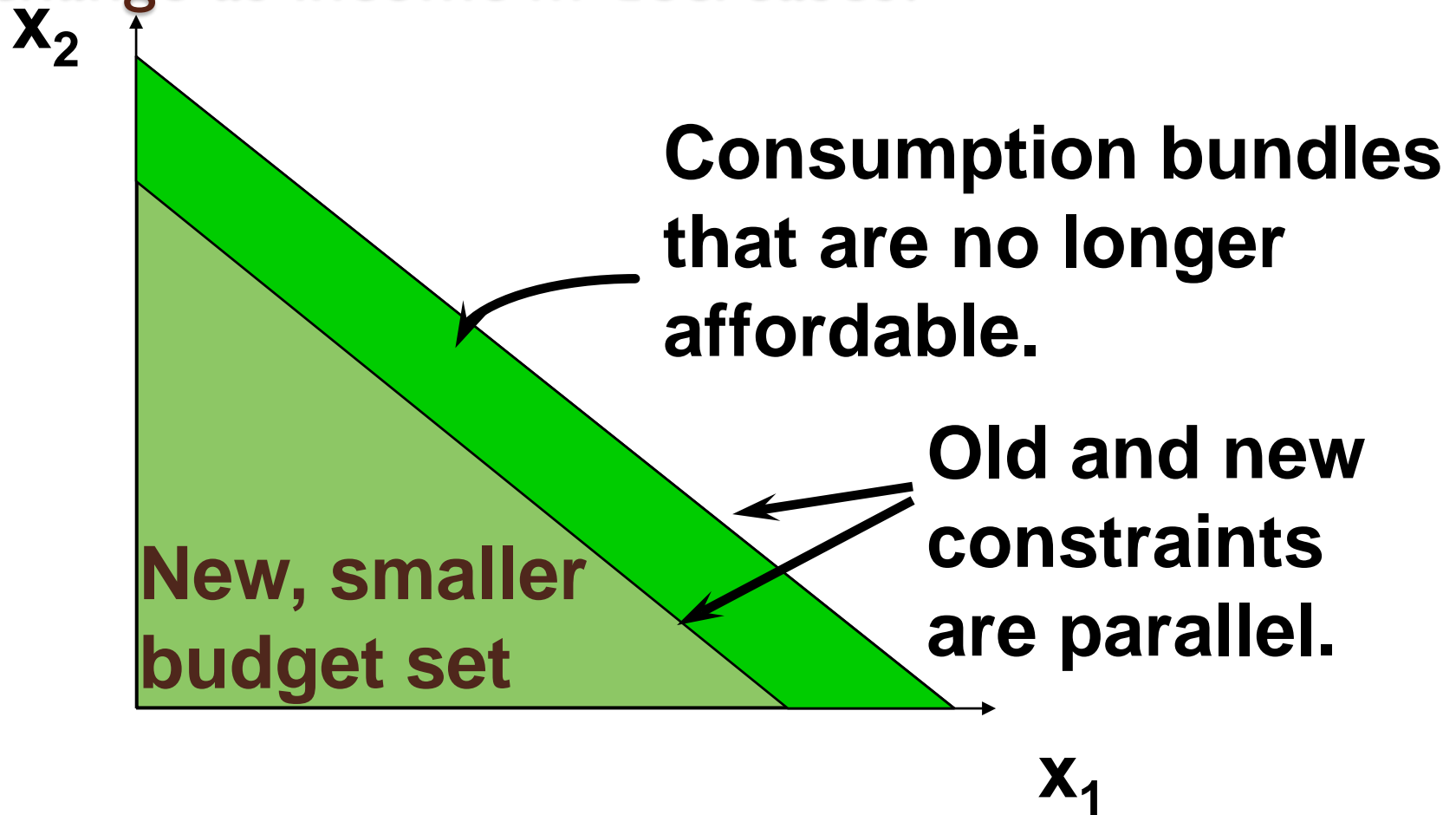
Higher income gives more choice



How do the budget set and budget constraint change as income m decreases?



How do the budget set and budget constraint change as income m decreases?



Budget Constraints - Income Changes

- **Increases** in income m **shift** the constraint outward in a parallel manner, thereby enlarging the budget set and improving choice.
- **Decreases** in income m **shift** the constraint inward in a parallel manner, thereby shrinking the budget set and reducing choice.

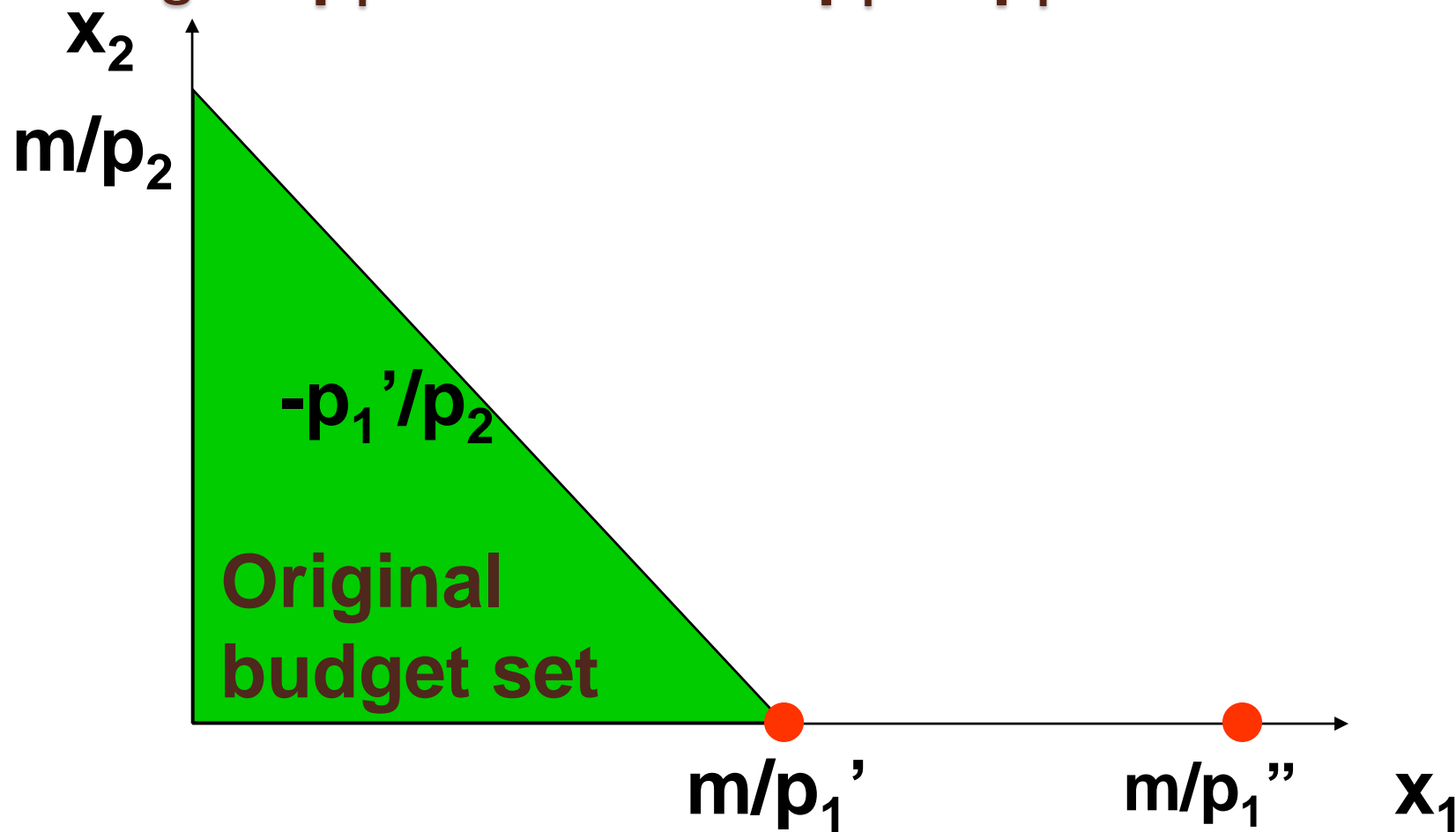
Budget Constraints - Income Changes

- No original choice is lost and new choices are added when income **increases**, so higher income cannot make a consumer worse off.
- An income **decrease** may (typically will) make the consumer worse off.

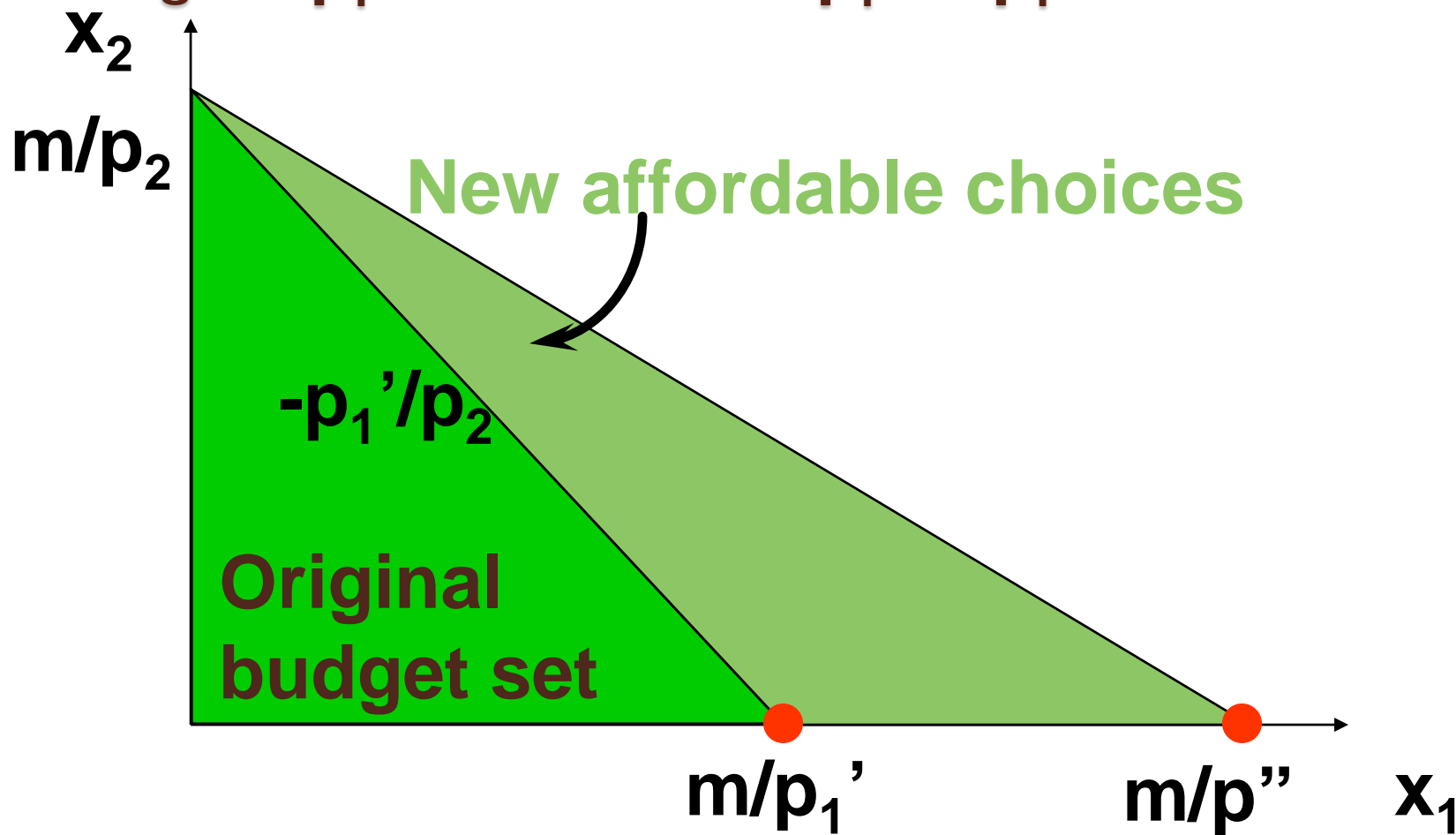
Budget Constraints - Price Changes

- What happens if just one price decreases?
- Suppose p_1 decreases.

How do the budget set and budget constraint change as p_1 decreases from p_1' to p_1'' ?



How do the budget set and budget constraint change as p_1 decreases from p_1' to p_1'' ?



Budget Constraints - Price Changes

- Reducing the price of one commodity **pivots** the constraint outward. No old choice is lost and new choices are added, so reducing one price cannot make the consumer worse off
- Similarly, **increasing** one price **pivots** the constraint inwards, reduces choice and may (typically will) make the consumer worse off.

Uniform *Ad Valorem* Sales Taxes

- An *ad valorem* sales tax (从价营业税) levied at a rate of 5% increases all prices by 5%, from p to $(1+0.05)p = 1.05p$.
- An *ad valorem* sales tax levied at a rate of t increases all prices by tp from p to $(1+t)p$.
- A uniform sales tax is applied uniformly to all commodities.

Uniform *Ad Valorem* Sales Taxes

- A uniform sales tax levied at rate t changes the constraint from

$$p_1x_1 + p_2x_2 = m$$

to

$$(1+t)p_1x_1 + (1+t)p_2x_2 = m$$

Uniform *Ad Valorem* Sales Taxes

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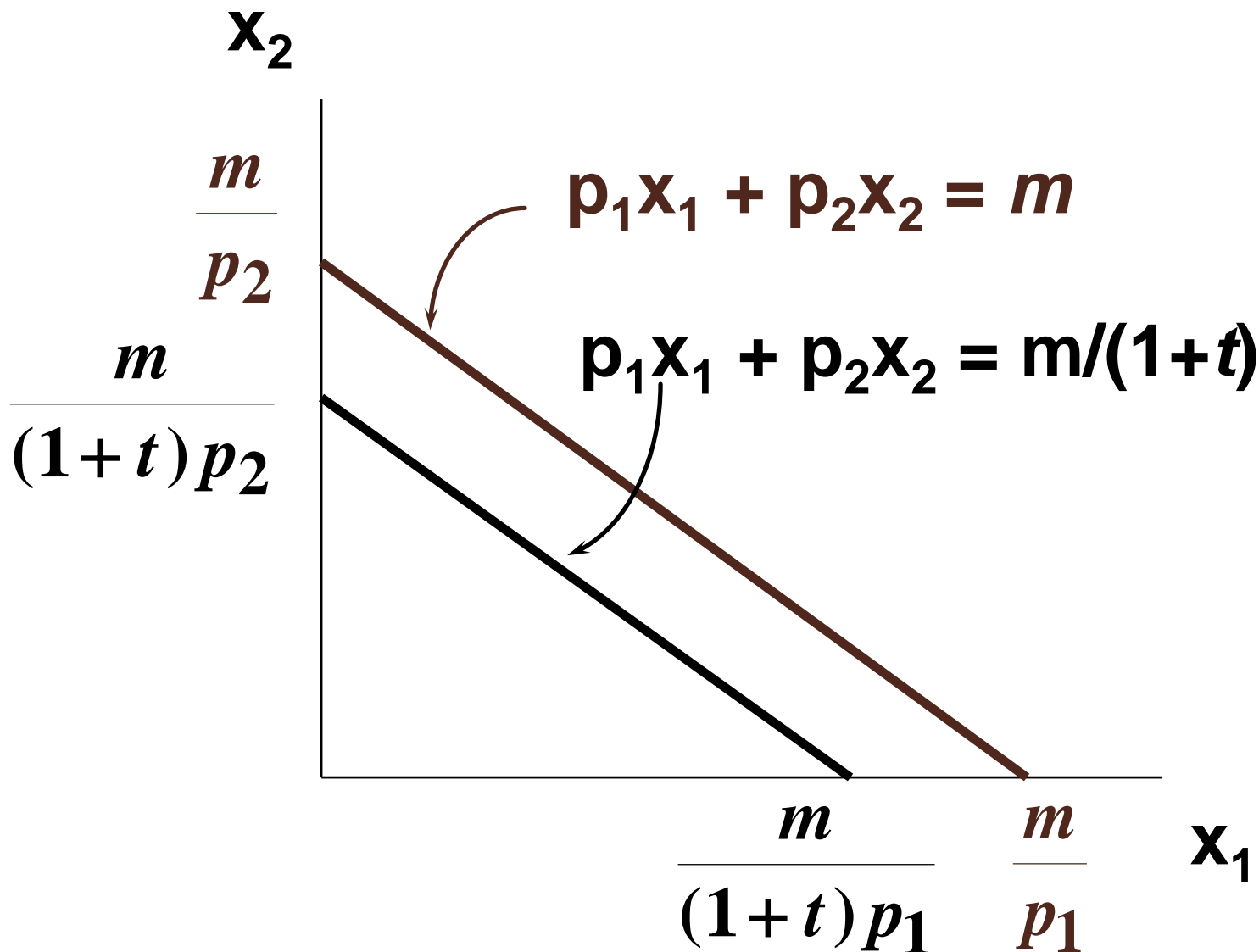
to

$$(1+t)p_1x_1 + (1+t)p_2x_2 = m$$

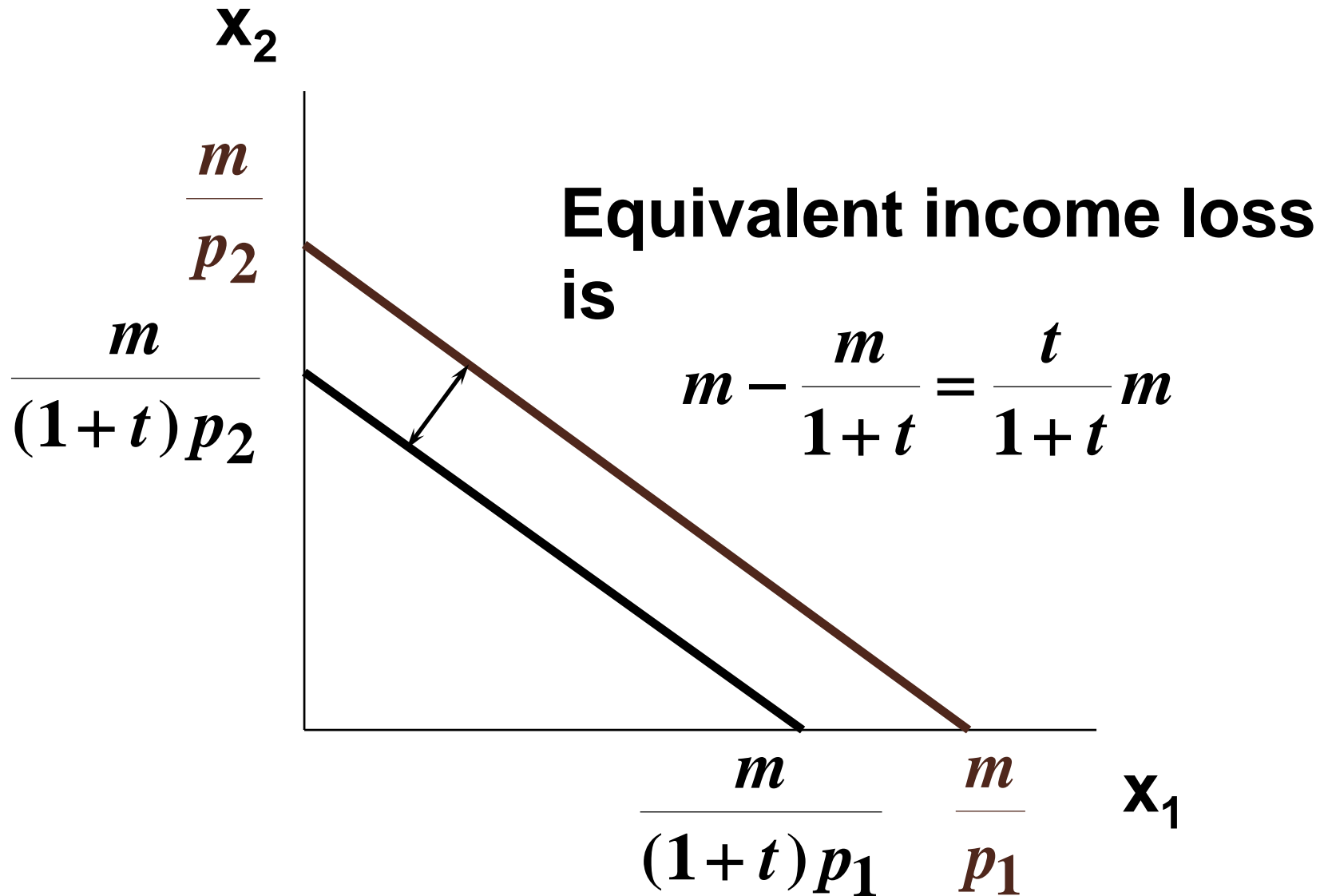
i.e.

$$p_1x_1 + p_2x_2 = m/(1+t).$$

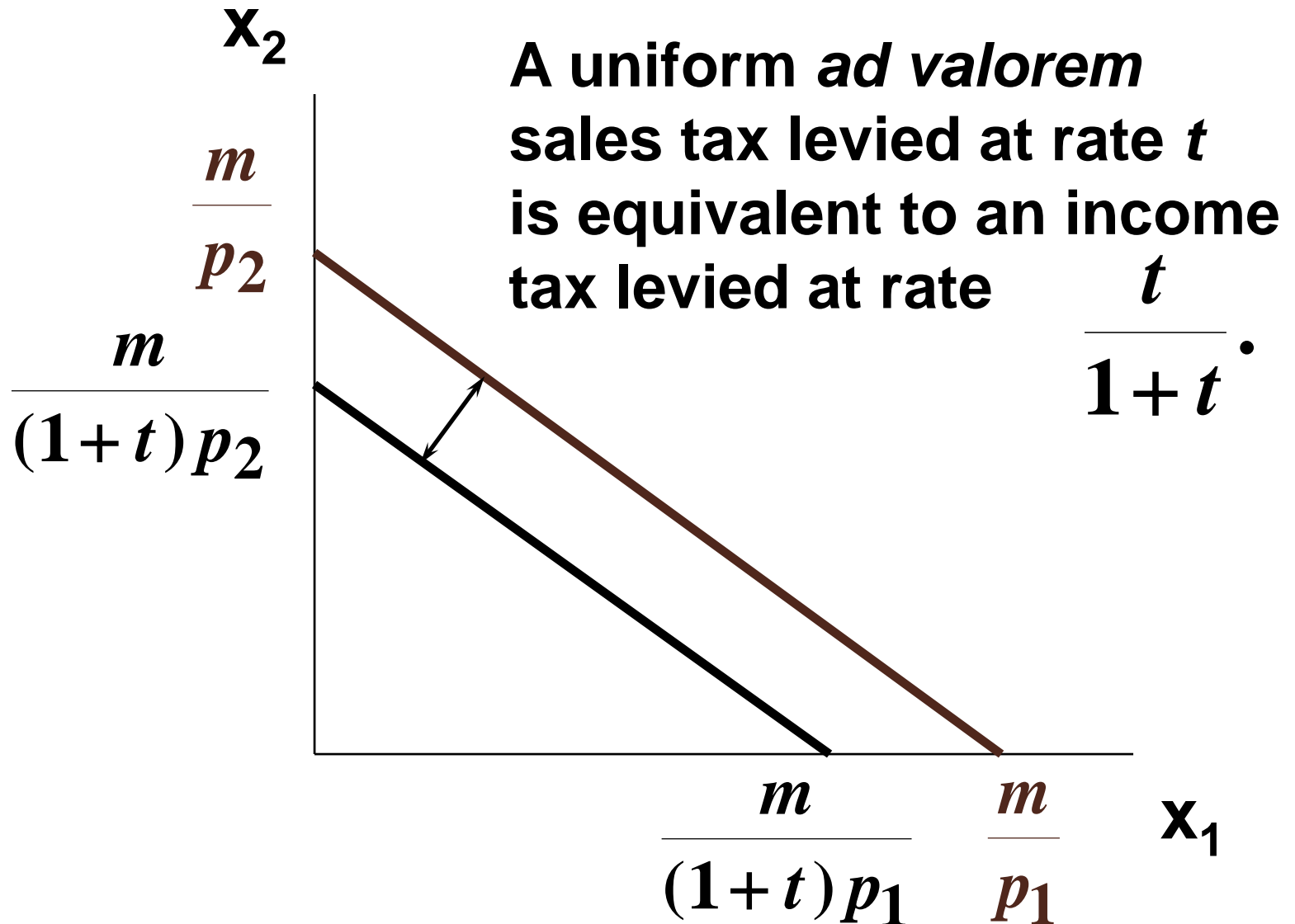
Uniform Ad Valorem Sales Taxes



Uniform Ad Valorem Sales Taxes



Uniform *Ad Valorem* Sales Taxes



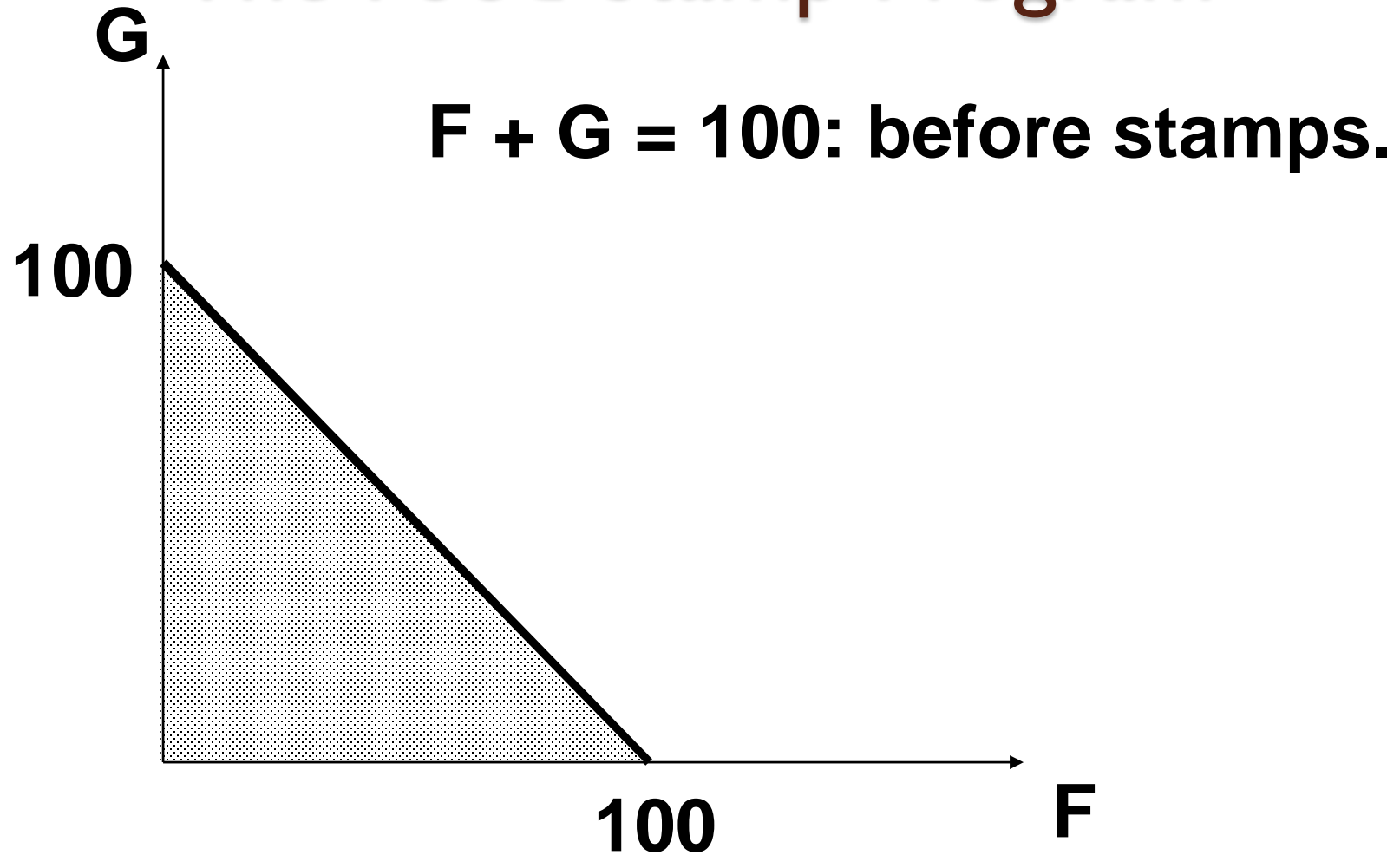
The Food Stamp Program

- Food stamps are coupons that can be legally exchanged only for food.
- How does a commodity-specific gift such as a food stamp alter a family's budget constraint?

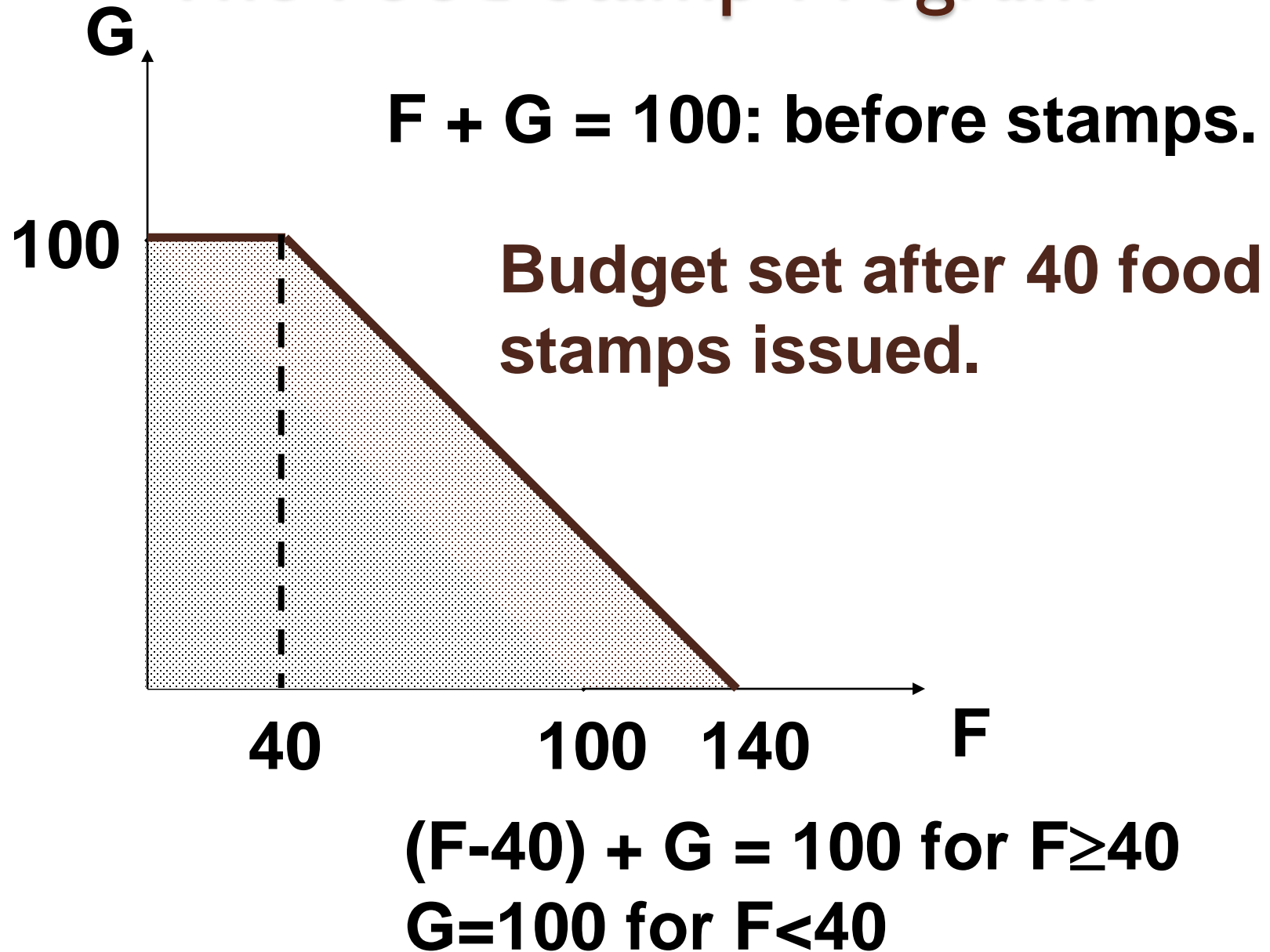
The Food Stamp Program

- Suppose $m = \$100$, $p_F = \$1$ and the price of “other goods” is $p_G = \$1$
- “Other goods” is a **composite good**
 - It simplifies the analysis to a 2-good model
- The budget constraint is then
$$F + G = 100.$$

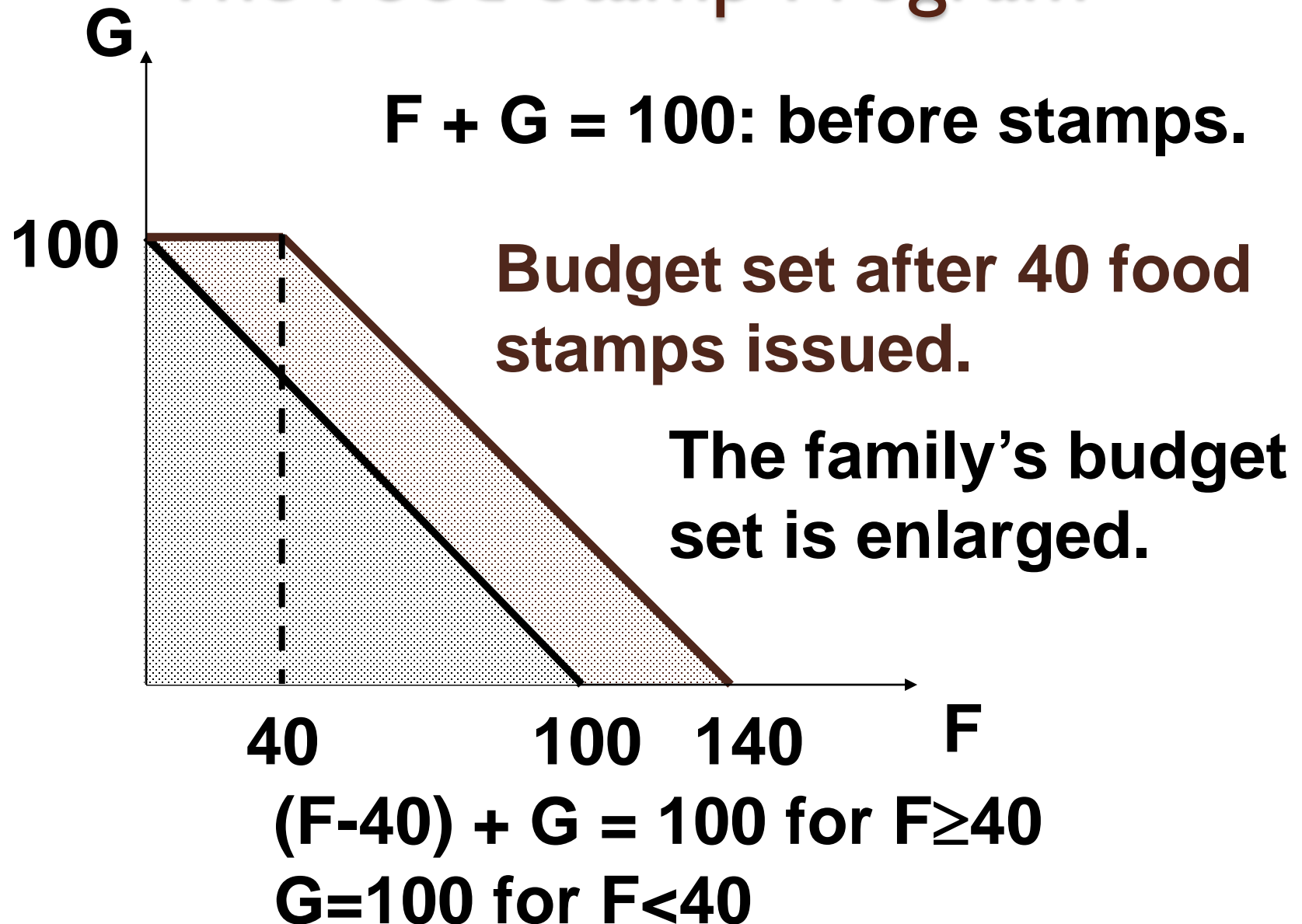
The Food Stamp Program



The Food Stamp Program



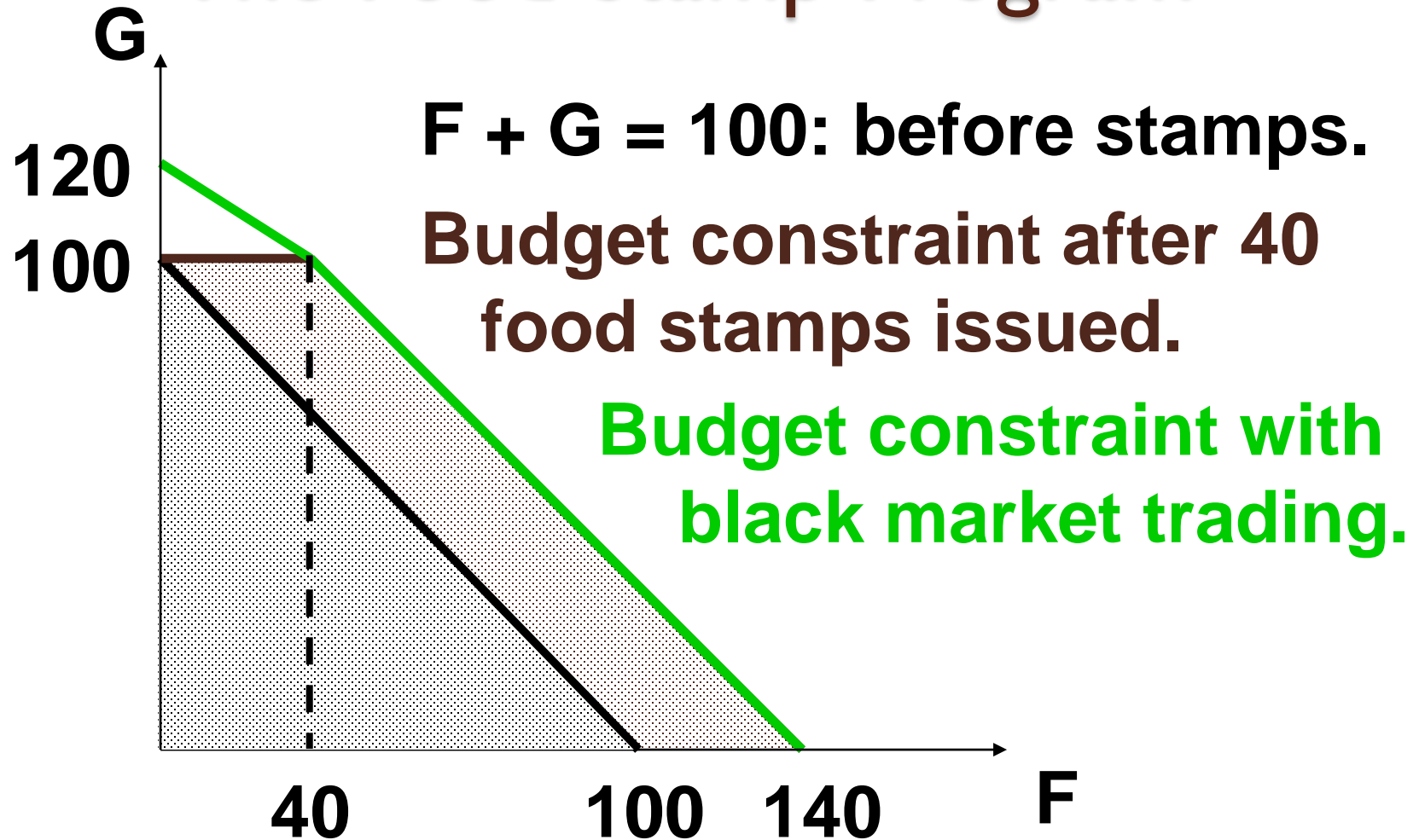
The Food Stamp Program



The Food Stamp Program

- What if food stamps can be traded on a black market for \$0.50 each?
- $G = 100 + 0.5 \times (40 - F)$ for $F < 40$
- $(F - 40) + G = 100$ for $F \geq 40$

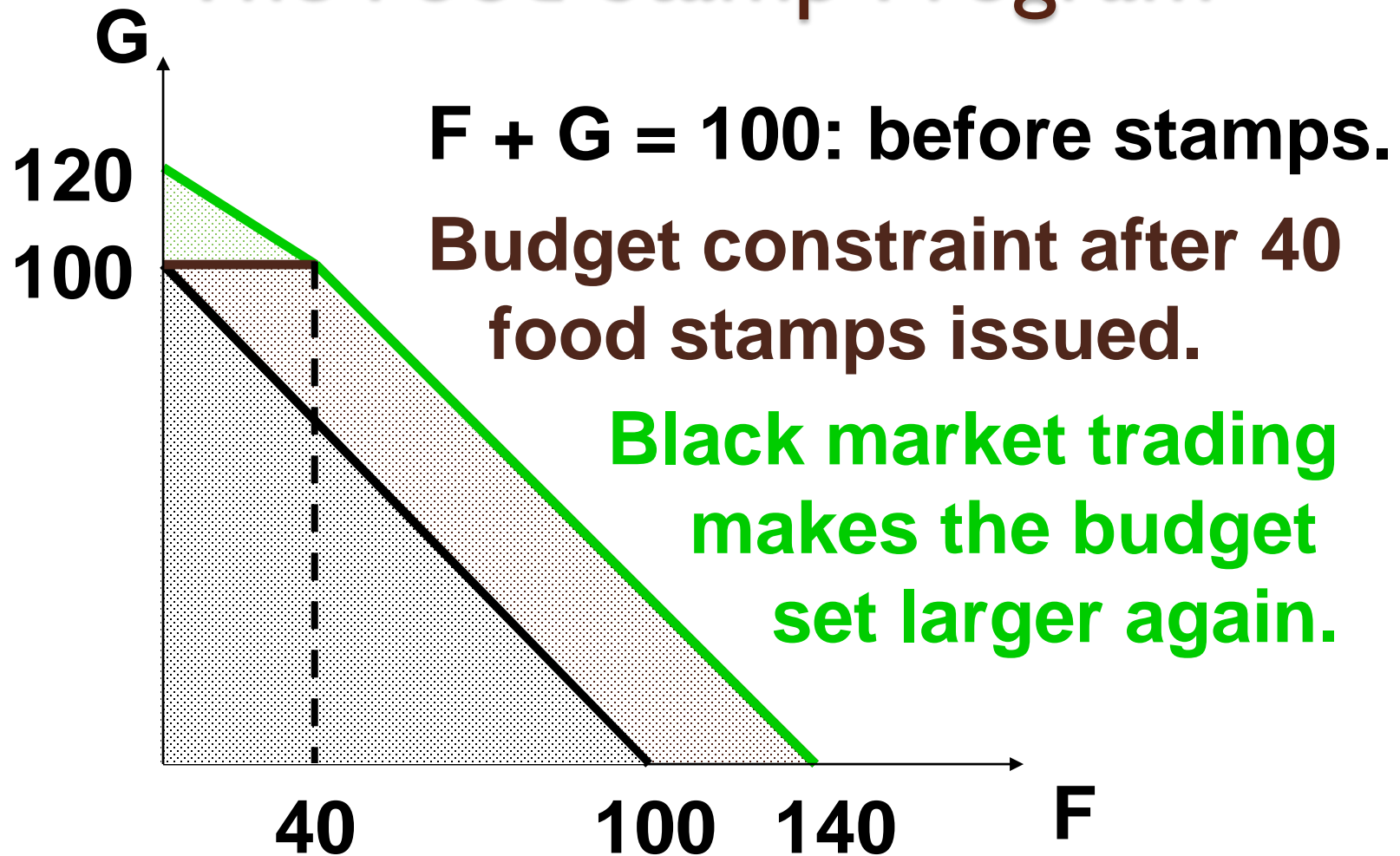
The Food Stamp Program



□ $G = 100 + 0.5 \times (40 - F)$ for $F < 40$

□ $(F - 40) + G = 100$ for $F \geq 40$

The Food Stamp Program



Shapes of Budget Constraints

- Q: What makes a budget constraint a straight line?
- A: A straight line has a constant slope and the constraint is

$$p_1x_1 + \dots + p_nx_n = m$$

so if prices are constants then a constraint is a straight line.

Shapes of Budget Constraints

- But what if prices are not constants?
- *E.g.* bulk buying discounts, or price penalties for buying “too much”.
- Then constraints will be curved.

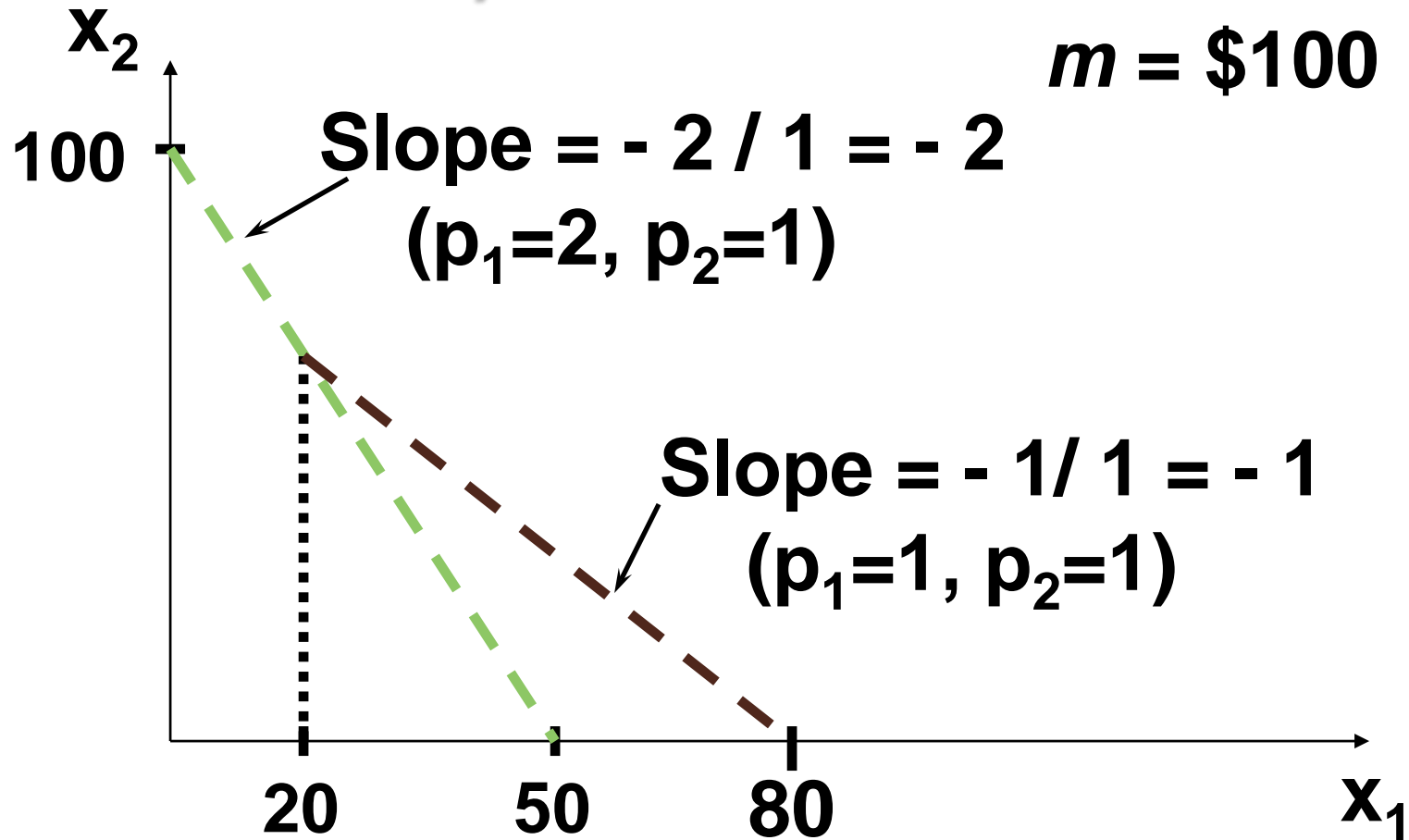
Shapes of Budget Constraints - Quantity Discounts

- Suppose p_2 is constant at \$1 but that $p_1 = \$2$ for $0 \leq x_1 \leq 20$ and $p_1 = \$1$ for $x_1 > 20$.

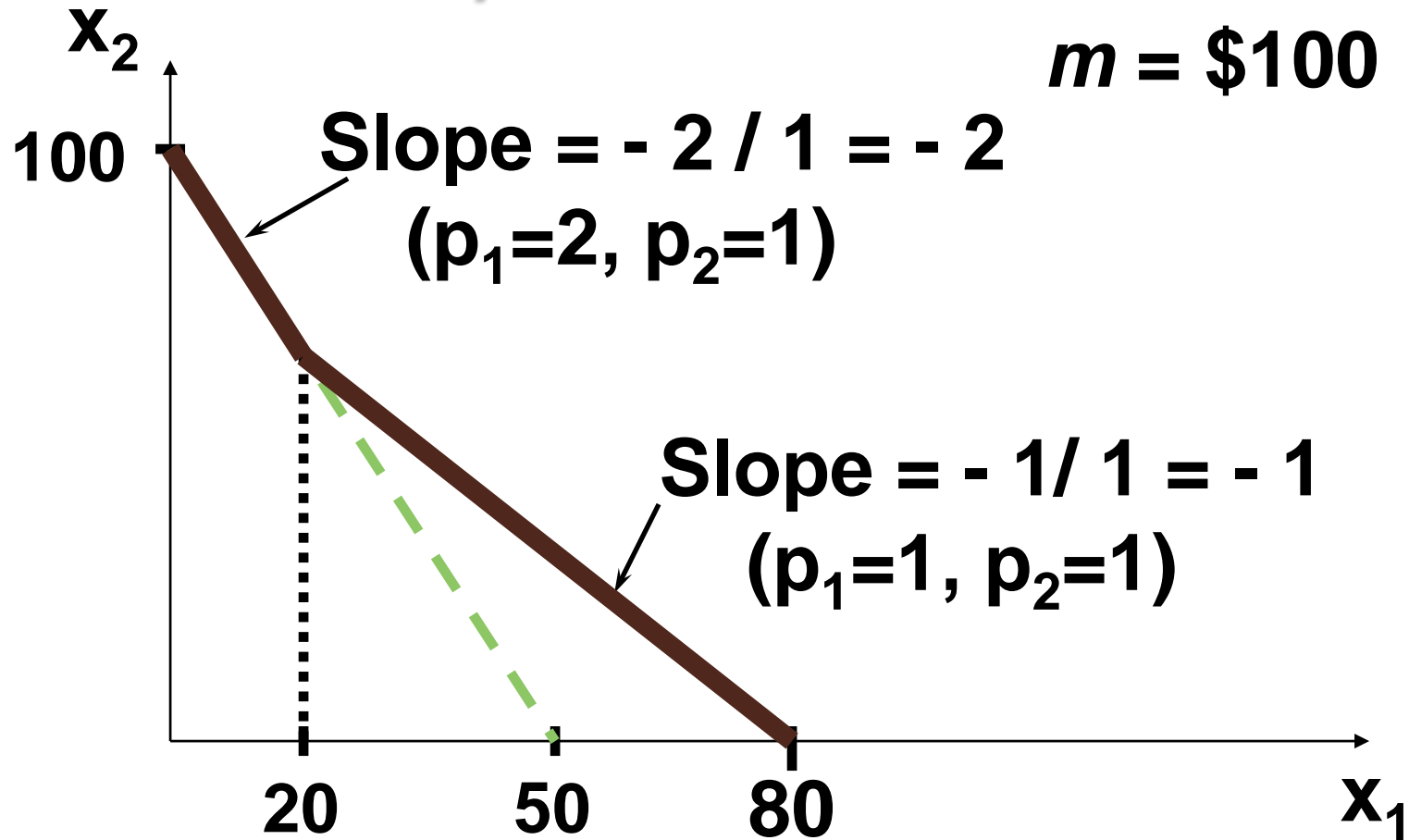
Shapes of Budget Constraints - Quantity Discounts

- Suppose p_2 is constant at \$1 but that $p_1 = \$2$ for $0 \leq x_1 \leq 20$ and $p_1 = \$1$ for $x_1 > 20$.
- Then the constraint's slope is
$$\frac{p_1}{p_2} = \begin{cases} 2, & \text{for } 0 \leq x_1 \leq 20 \\ 1, & \text{for } x_1 > 20 \end{cases}$$

Shapes of Budget Constraints with a Quantity Discount



Shapes of Budget Constraints with a Quantity Discount



Budget Constraints with a Quantity Discount

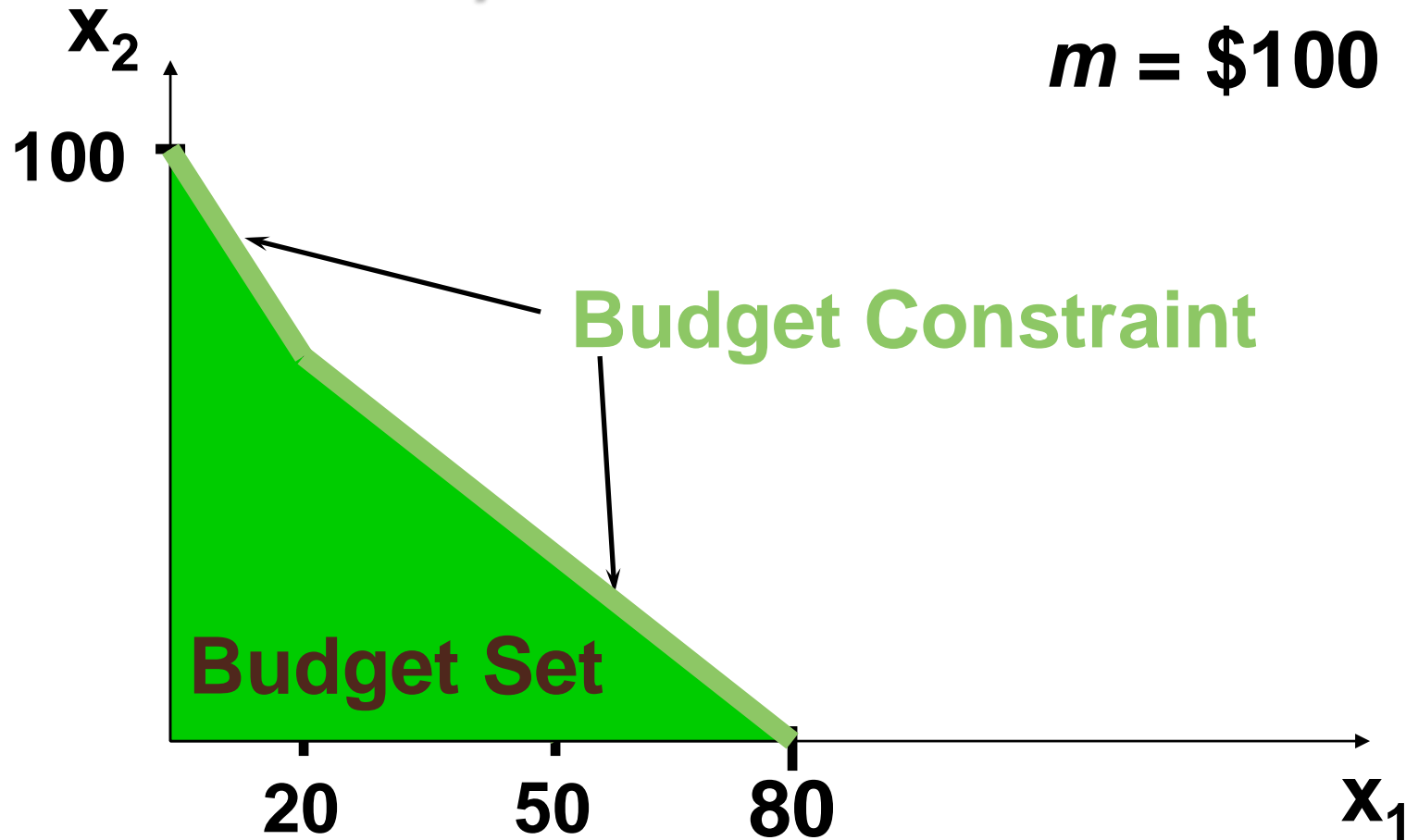
- The constraint is

$$2x_1 + x_2 = m \text{ for } 0 \leq x_1 \leq 20$$

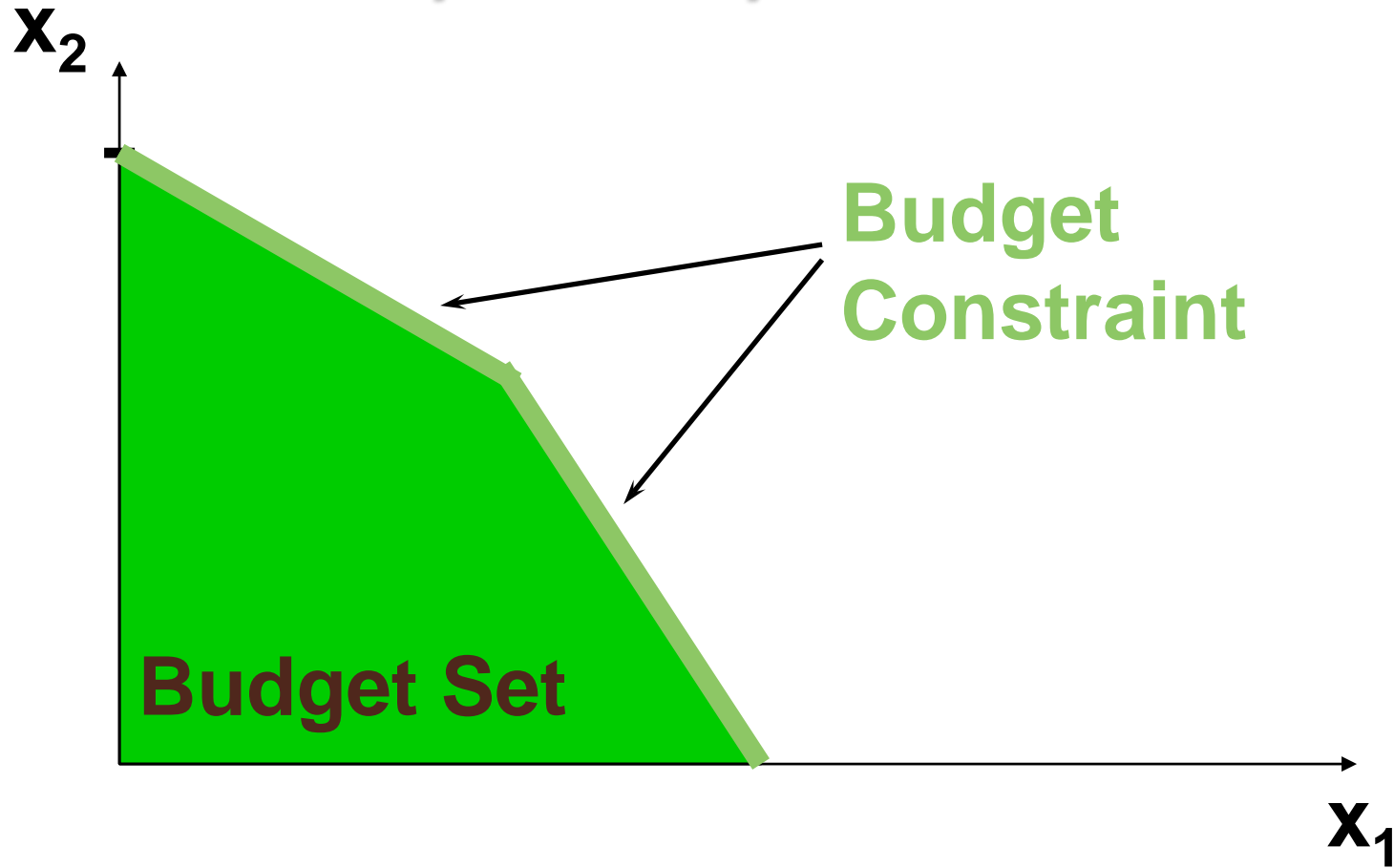
$$2 \times 20 + (x_1 - 20) + x_2 = m \text{ for } x_1 > 20$$

Shapes of Budget Constraints with a Quantity Discount

$$m = \$100$$



Shapes of Budget Constraints with a Quantity Penalty



Exicse

Suppose the price of the consumption is 1, and the consumer earn wage rate of s per hours for the first 8 hours of work and $s' > s$ for additional (overtime) hours. He also face a tax rate t per dollar on labor income earned above amount M . Write down the budget constraint and graph it.

Budget set

- Walrasian or competitive budget set:

$$B_{p,w} = \left\{ x \in \mathbb{R}_+^L : p \cdot x \leq w \right\}.$$

- $B_{p,w}$ is Convex!
- budget hyperplane: $p \cdot x = w$